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EXAMINER	
TAKAOKA, DEAN O	
ART UNIT	PAPER NUMBER
2817	

DATE MAILED: 01/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/671,783	TSUTSUMI ET AL.	
	Examiner	Art Unit	
	Dean O Takaoka	2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *3-7 and 23* is/are allowed.

6)☒ Claim(s) *1,2,8-11,13-18 and 20-22* is/are rejected.

7)☒ Claim(s) *12 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 14 – 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Hickernell (U.S. Patent No. 6,201,457).

Claim 1:

Hickernell shows a surface acoustic wave filter (105 – Fig. 6) comprising series-arm resonators and parallel arm resonators that are connected in a ladder-like structure, each having an interdigital transducer formed on a piezoelectric substrate (col. 2, lines 60-63), and at least one of the series arm resonators having a different static capacitance from the other series arm resonators (different static capacitances Co of the series arm resonators shown in Fig. 6) where at least one series arm resonators, except the series arm resonator located at the first stage in the ladder-like structure, has a lower resonant frequency than the other series arm resonators (where resonant frequency of the last series arm resonator 879.46MHz is lower than the middle series arm resonator 882.29MHz – Fig. 6).

Claim 14:

Where the series arm resonators each have reflectors located on opposite sides (col. 2, lines 65-67; optional reflectors).

Claim 15:

Where the series and parallel arm resonators each has a single electrode structure (col. 2, lines 65-67; optional reflectors).

Claim 16:

Where the piezoelectric substrate of each of the series and parallel arm resonators is made of 42° Y-cut X-propagation $LiTaO_3$ (col. 3, line 67 to col. 4, line 5 and col. 5, lines 61-62).

Claim 17:

Hickernell shows a surface acoustic wave duplexer (503; where the surface acoustic wave filter 505 is included in the duplexer – col. 7, line 31 and line 49-52) comprsing two filters having different passbands (where the duplexer transmits and receives two different frequency signals, col. 7, lines 32-34) one of the two filters located on a lower frequency side comprising a surface acoustic wave filter (where the SAW filter is incorporated into the receiving side, col. 7, lines 51-52) and comprising series-arm resonators and parallel arm resonators that are connected in a ladder-like structure, each having an interdigital transducer formed on a piezoelectric substrate, and at least one of the series arm resonators having a different static capacitance from the other series arm resonators where at least one series arm resonators, except the series arm resonator located at the first stage in the ladder-like structure, has a lower resonant frequency than the other series arm resonators (discussed in the reasons for rejection of claim 1 above).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hickernell in view of Inose et al. (U.S. Patent No. 6,031,435).

Claim 2:

Hickernell shows a surface acoustic wave filter comprising series-arm resonators and parallel arm resonators that are connected in a ladder-like structure discussed in the reasons for rejection of claim 1 above, and generically teaches the pitch of the transducers may be changed (col. 6, lines 40-45) but is silent for specifically detailing where at least one series arm resonators, except the series arm resonator located at the first stage in the ladder-like structure, has an interdigital transducer with a longer electrode finger pitch than the average of electrode finger pitches of the interdigital transducers of the other series arm resonators.

Inose et al. shows a similar surface acoustic wave filter comprising series and parallel arm resonators connected in a ladder-like structure where the resonant frequency decreases in each successive series resonators, similar to the ladder shown by Hickernell in addition to also decreasing the pitch of the transducers in each successive series resonator (abstract and col. 7, lines 7-39; where the pitch and frequency are successively decreased in the SAW ladder filter).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the generic finger pitch disclosed by Hickernell with the specific decreased finger pitch disclosed by Inose et al. Such a modification would have been a mere implementation of a well-known art recognized equivalent method of frequency modification where both Hickernell and Inose et al. teach similar SAW ladder filters with decreasing frequencies; where Hickernell teaches generically to modify the pitch of the interdigital transducers and where Inose et al. specifically teaches to decrease the pitch thus suggesting the obviousness of the modification.

Claim 22:

Hickernell teaches the surface acoustic wave duplexer comprising two filters having different passbands, comprising series-arm resonators and parallel arm resonators that are connected in a ladder-like structure, each having an interdigital transducer formed on a piezoelectric substrate, and at least one of the series arm resonators having a different static capacitance from the other series arm resonators (discussed above in the reasons for rejection of claim 17 above); where Hickernell and Inose et al. teach at least one series arm resonators, except the series arm resonator located at the first stage in the ladder-like structure; where an interdigital transducer with a longer electrode finger pitch than the average of electrode finger pitches of the interdigital transducers of the other series arm resonators (discussed in the reasons for rejection of claim 2 above).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hickernell ('457) in view of Hickernell et al. (U.S. Patent No. 5,313,177).

Claim 8:

Hickernell ('457) teaches the surface acoustic wave filter comprising a ladder filter with series and shunt arm resonators, discussed in the reasons for rejection of claim 1 above, and where the pitch of the electrode fingers may be modified (col. 6, lines 43-45) but does not specifically recite at least one series arm resonator has an interdigital transducer electrode finger width in the range of 15% to 22.5% of an electrode finger pitch.

Hickernell et al. ('177) teaches a surface acoustic wave filter where an interdigital transducer electrode finger has a width in the range of 15% to 22.5% of an electrode finger pitch (col. 7, lines 62 to col. 8, line 59; i.e. where $1/5\lambda = 20\%$, $1/6\lambda = 16.66\%$, et al.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the generic electrode width disclosed by Hickernell ('457) with the specific electrode finger width disclosed by Hickernell et al. ('177). Such a modification would have realized the advantageous benefit of providing low insertion loss (col. 7, line 46); where Hickernell ('457) also teaches desirability of

improving insertion loss performance of the filter (abstract) and well-known design methods such as changing the pitch of the fingers (col. 6, lines 42-45 – Hickernell '457) thus suggesting the obviousness of the modification.

Claims 9 and 10:

Where the interdigital transducer with the electrode finger width in the range of 15% to 22.5% of an electrode finger pitch has electrode fingers of uniform width or irregular width (where Hickernell et al. '177 shows uniform widths and irregular widths – Figs. 6 and 7).

Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hickernell in view of Bergmann et al. (U.S. Patent No. 6,777,855).

Claim 11:

Hickernell teaches the surface acoustic wave filter comprising a ladder filter with series and shunt arm resonators, discussed in the reasons for rejection of claim 1 above, but is silent where at least one series arm resonator has dummy electrodes that are located at the electrode finger non-crossing parts and do not contribute to excitation of the surface acoustic wave.

Bergmann et al. shows a surface acoustic wave resonator comprising a dummy electrodes that are located at the electrode finger non-crossing parts and do not contribute to excitation of the surface acoustic wave (where the split electrodes of Bergmann et al. are most nearly identical to that shown by the Applicant in Fig. 12,

further where Bergmann et al. teaches reflection free split finger transducer col. 1, lines 46-50 and col. 2, lines 4-8).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the electrodes disclosed by Hickernell with the non-crossing dummy electrodes disclosed by Bergmann et al. Such a modification would have realized the advantageous benefit of providing among other advantages, wider bandwidth and low insertion loss (col. 3, lines 11, 12 and lines 21, 22 – Bergmann et al.) where Hickernell also teaches desirability of improving insertion loss performance of the filter (abstract – Hickernell) and well-known design methods such as changing the pitch of the fingers (col. 6, lines 42-45 – Hickernell) thus suggesting the obviousness of the modification.

Claim 13:

Where each of the dummy electrodes faces a top end of each corresponding electrode finger of the interdigital transducer (where the split electrodes of Bergmann et al. are most nearly identical to that shown by the Applicant in Fig. 12).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hickernell ('457) and Inose et al. as applied to claim 2 above, and further in view of Hickernell et al. ('177)

Hickernell and Inose et al. teach the surface acoustic wave filter comprising a ladder filter with series and shunt arm resonators, discussed in the reasons for rejection of claim 2 above, where Hickernell ('457) further teaches the pitch of the electrode

fingers may be modified (col. 6, lines 43-45) but does not specifically recite at least one series arm resonator has an interdigital transducer electrode finger width in the range of 15% to 22.5% of an electrode finger pitch.

Hickernell et al. ('177) teaches a surface acoustic wave filter where an interdigital transducer electrode finger has a width in the range of 15% to 22.5% of an electrode finger pitch (col. 7, lines 62 to col. 8, line 59; i.e. where 1/5λ = 20%, 1/6λ = 16.66%, et al.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the generic electrode width disclosed by Hickernell ('457) and Inose et al. with the specific electrode finger width disclosed by Hickernell et al. ('177). Such a modification would have realized the advantageous benefit of providing low insertion loss (col. 7, line 46); where Hickernell ('457) also teaches desirability of improving insertion loss performance of the filter (abstract) and well-known design methods such as changing the pitch of the fingers (col. 6, lines 42-45 – Hickernell '457) thus suggesting the obviousness of the modification.

Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hickernell and Inose et al. as applied to claim 2 above, and further in view of Bergmann et al.

Hickernell and Inose et al. teach the surface acoustic wave filter comprising a ladder filter with series and shunt arm resonators, discussed in the reasons for rejection of claim 2 above, but are silent where at least one series arm resonator has dummy

electrodes that are located at the electrode finger non-crossing parts and do not contribute to excitation of the surface acoustic wave.

Bergmann et al. shows a surface acoustic wave resonator comprising a dummy electrodes that are located at the electrode finger non-crossing parts and do not contribute to excitation of the surface acoustic wave (where the split electrodes of Bergmann et al. are most nearly identical to that shown by the Applicant in Fig. 12, further where Bergmann et al. teaches reflection free split finger transducer col. 1, lines 46-50 and col. 2, lines 4-8).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the electrodes disclosed by Hickernell and Insoe et al. with the non-crossing dummy electrodes disclosed by Bergmann et al. Such a modification would have realized the advantageous benefit of providing among other advantages, wider bandwidth and low insertion loss (col. 3, lines 11, 12 and lines 21, 22 – Bergmann et al.) where Hickernell also teaches desirability of improving insertion loss performance of the filter (abstract – Hickernell) and well-known design methods such as changing the pitch of the fingers (col. 6, lines 42-45 – Hickernell) thus suggesting the obviousness of the modification.

Allowable Subject Matter

Claims 3 – 7 and 23 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 3 and 23:

Hickernell shows the SAW ladder filter where the static capacitance Co of the series arm resonator located at the last stage has a larger static capacitance than the other series arm resonators. Insoe et al. shows a similar SAW ladder filter where the successive series resonant elements comprise decreasing resonant frequency but does not teach static capacitance Co, nor would it have been obvious to modify the ladder filters to meet the limitation of independent claim 3 thus the claims are found in condition for allowance.

Claims 12 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Takamine et al. – shows a SAW IDT comprising dummy electrodes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dean O Takaoka whose telephone number is (571) 272-1772. The examiner can normally be reached on 8:30a - 5:00p Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (571) 272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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January 14, 2005